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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/675,289	09/29/2003	William F. Micka	TUC920030045US1	5437

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EXAMINER	
TIMBLIN, ROBERT M	

ART UNIT	PAPER NUMBER
2167	

NOTIFICATION DATE	DELIVERY MODE
02/22/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/675,289	MICKA ET AL.	
	Examiner	Art Unit	
	ROBERT TIMBLIN	2167	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 November 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/ are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This office action corresponds to application 10/675,289 filed9/29/2003.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/5/2007 has been entered.

Response to Amendment

The Examiner acknowledges and enters the amendments made to this application. Accordingly, claims 1-18 have been examined and are pending prosecution.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beal et al. ("Beal" hereinafter) (US 5,155,845) in view of Tan et al. ("Tan" hereinafter) (US 2003/0126347 A1) and further in view of Beardsley et al. ('Beardsley' hereinafter) (U.S. Patent 6,061,750).

With respect to claim 1, and similar claims 7 and 13, Beal discloses A method to coordinate interconnected information storage and retrieval systems, wherein each of the information and storage systems is capable of communicating with one or more host computers, comprising the steps of:

'providing a host computer' (drawing 101).

providing a plurality information storage and retrieval systems (figure 1 shows at least two storage systems as DSCs 105, 107), wherein each information storage and retrieval system comprises and at least two hard disk arrays (109, 111), wherein each of said plurality of information storage and retrieval systems (105, 107) is interconnected (i.e. figures 1-4 and col. 5 line 50-53) illustrate the interconnectivity with the other systems) with each of the other information storage and retrieval systems (drawing reference 106, 110, 108) is interconnected with said host computer (drawing reference 101, 102, 104 and figures 1-2); and wherein each of said information storage and retrieval systems is interconnected with a different remote storage location' (col. 8 line 25-39; col. 14, line 21-38; figs. 1-4).

'providing a plurality of controllers (105, 107, 113 and 112), wherein two active controllers are disposed in each of said plurality of information storage and retrieval systems (105 and 112 are both controllers in the same storage system).' A DASD subsystem comprises a

plurality of data storage control units (DSC) (col. 2, lines 60-67). A single DSC can be connected to one or more disk controllers (col. 9, line 53-55).

providing by each of said plurality of controllers (108, 110 and col. 9 line 54-55), using peer to peer copy operations (col. 14 line 21-30; i.e. the use of an extended dual-copy operation), information from an information storage medium disposed in an information storage and retrieval system to an information storage medium disposed in an interconnected remote storage location (col. 14 line 21-31; i.e. the dual-copy operation is used to synchronize a local and remote drive);

Beal fails to explicitly describe designating one of said plurality of controllers as a master controller and the remaining controllers as target controllers; generating one or more master controller commands by said master controller; providing said one or more master controller commands to each of said target controllers, wherein said one or more master controller commands cause said target controllers to adjust the flow of data into and out of each of said one or more information storage and retrieval systems.

Beal also fails to explicitly disclose wherein each of said plurality of controllers comprises logic enabling that controller to function as a master controller, or as a target controller, or as both a master and a target controller.

Tan, however teaches designating one of said plurality of controllers (figure1) as a master controller (active controller; 0023) and the remaining controllers as target controllers (0029; identifying the standby controller as a target device, 0023);

generating one or more master controller commands by said master controller (as the commands disclosed in 0025, 0029 and 0032);

providing said one or more master controller commands to each of said target controllers, wherein said one or more master controller commands cause said target controllers to adjust the flow of data into and out of each of said one or more information storage and retrieval systems (0023, 0030 and 0032) discuss commands from the active controller to the standby controller).

Tan also teaches wherein each of said plurality of controllers (130, 150) comprises logic ([0024], second column, first 2 lines) enabling that controller to function as a master controller, or as a target controller ([0024] master and target devices), or as both a master and a target controller ([0024] both controllers 130, and 150 may be configured to be both master and target devices) for designating a device as master or target.

In the same field of endeavor, (i.e. providing data redundancy), it would have been obvious to one of ordinary skill in the data processing art at the time of the present invention to combine the teachings of the cited references because the teachings of Tan would have given Beal's invention inter-controller communication to facilitate communication between the controllers. Such teachings would provide the benefit of an improved controller redundancy (Tan at paragraph 0010). Tan also would have given Beal a way to condition to DSC 105 and 107 to both act as master controllers (as disclosed by Beal in col. 31 line 67-col. 32 line 2) or act as a secondary or primary device (disclosed by Beal in col. 14 line 8-14).

Furthermore, although Beal's storage systems may include one or more controllers, there remains a need for improved communication between them for improved data redundancy.

The combination of Beal and Tan do not expressly teach wherein each information storage and retrieval system comprises a plurality of I/O adapters, two data caches interconnected to said plurality of I/O adapters, a device adaptor interconnected to said plurality

of I/O adapters and to said data caches, and at least two hard disk arrays interconnected with said device adapter.

Beardsley, however, teaches wherein each information storage and retrieval system comprises a plurality of I/O adapters (see figure 3; e.g. the connections to hosts 34 and connections to DASDS A-B describe at least a plurality of I/O adaptors as well as bridges 24a-b also serve as a adaptors), two data caches (figure 3, drawing references 16,18) interconnected to said plurality of I/O adapters (i.e. host and DASDS connections), a device adaptor (see figure 3, drawing references 20, 22) interconnected to said plurality of I/O adapters (i.e. host and DASDS connections) and to said data caches 16-18), and at least two hard disk arrays (figure 3, drawing references 4, 6) interconnected with said device adapter (see figure 3, drawing references 20, 22) to provide communication within a storage system.

In the same field of endeavor, (i.e. data storage), it would have been obvious to one of ordinary skill in the data processing art at the time of the present invention to combine the teachings of the cited references because Beardsley would have given the combination of Beal and Tan an efficient hardware configuration including a device adaptor to communicate to DASDS in case of a failure.

The limitations of claims 7 and 13 have been rejected for the same reasons as this claim for being essentially similar to claim 1. Furthermore, With respect to claims 7 and 13, Beal teaches wherein each of said plurality of information storage (105, 107) and retrieval systems comprises two active controllers as 105 and 112 are both controllers in the same storage system.

With respect to claims 2, 8, and 14, Tan discloses 'one or more master controller commands causing each of said target controllers to stop accepting write operations from said one or more host computers' (0025 and 0029).

With respect to claims 3, 9, and 15, Tan discloses 'each of said target controllers to form one or more consistency groups' as maintaining consistency groups (0007).

With respect to claims 4, 10, and 16, Tan discloses 'causing each of said target controllers to stop providing data to said one or more remote storage locations' as initiating and terminating data transfers (0029).

With respect to claims 5, 11, and 17, Beal discloses 'providing a host computer policy command to said master controller' as a host specifying a multiple copy service (col. 3 line 10-13).

'providing at a first time by said master controller to each target controller one or more first master controller commands' as a sequence of commands (col. 19, lines 34-50).

'providing at a second time by said master controller to each target controller one or more second master controller commands' as a sequence of commands (col. 19, lines 34-50).

With respect to claims 6, 12, and 18, Beal discloses 'providing status information to said master controller by each target controller' as the host is notified of the completion of the execution of the write command (col. 3, lines 30-42).

Response to Arguments

Applicant's arguments filed 11/5/2007 have been fully considered but they are not persuasive.

Applicant argues (see page 10 of the response) that Neither Beal nor Tan teach providing a plurality of information storage and retrieval systems, wherein each information storage and retrieval system comprises a plurality of I/O adapters, two data caches interconnected to said plurality of I/O adapters, a device adapter interconnected to said plurality of I/O adapters and to said data caches, and at least two hard disk arrays interconnected with said device adapter.

The Examiner respectfully submits that although the aforementioned limitation is not expressly found in the Beal and Tan references, Beardsley teaches this limitation as seen in the foregoing rejection. Specifically, Beardsley explicitly teaches the use of a device adapter interconnected with components in an information storage and retrieval system (see also figure 3, of Beardsley).

The Applicant further argues (see last paragraph of page 10) that Neither Beal or Tan teach an information storage system further comprising two active controllers as recited in claims 1, 7, and 13.

The Examiner respectfully submits that the at least Beal describes the provision of two active controllers for an information storage system. Specifically, Beal teaches that *one or more* disk controllers may be assigned to a single DSC (i.e. a storage system). With the teaching that these controllers are operated and used in a dual copy arrangement, Beal sufficiently teaches the use of two active controllers in a storage system.

The Applicant also argues that Tan teaches away from the present invention (2nd paragraph on page 11 of the response) by disclosing that there may an active and a standby controller that may reverse during operations. The Examiner submits that Tan does not teach away from the claims. For example, Tan teaches the use of two controllers in a storage system – one active and one standby. The Examiner gives a reasonable interpretation that the standby controller is in effect, an "active" controller. Although labeled as standby, this controller is still active in that it remains functioning in use of the system. Specifically, paragraph 0012-0013 in Tan mentions that the standby controller processes messages from the active controller (see last 4 lines of 0012, Tan). Further, Tan teaches the standby functions to write a reply to an active controller and driving an interrupt to the active controller (last 4 lines of column 1, page 2, Tan). The Examiner submits that the functioning of the standby controller in such a manner encompasses the broadly claimed "active" limitation. In other words, the sending of replies and interrupts can describe the second (standby) controller as essentially "active."

Moreover, the Applicant argues (last paragraph of page 10 in the response) that Beal nor Tan teach providing, by each of the plurality of controllers, using peer to peer copy operations, information from an information storage medium disposed in an information storage and

retrieval system to an information storage medium disposed in an interconnected remote storage location.

The Examiner respectfully disagrees as Beal teaches the foregoing in the above rejection of claims 1, 7, and 13. That is, Beal discloses providing by each of said plurality of controllers (108, 110 and col. 9 line 54-55), using peer to peer copy operations (col. 14 line 21-30; i.e. the use of an extended dual-copy operation), information from an information storage medium disposed in an information storage and retrieval system to an information storage medium disposed in an interconnected remote storage location (col. 14 line 21-31; i.e. the dual-copy operation is used to synchronize a local and remote drive). In other words, the system of Beal uses a remote to local synching mechanism to provided a peer to peer copy operation.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 6,247,099 to Skazinski et al. The subject matter disclosed therein pertains to the pending claims (i.e. dual active controllers).

U.S. Patent 6,567,889 to DeKoning et al. The subject matter disclosed therein pertains to the pending claims (i.e. a storage system with a plurality of controllers and caches).

U.S. Patent 7,107,320 to Busser et al. The subject matter disclosed therein pertains to the pending claims (i.e. a second active controller).

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert M. Timblin whose telephone number is 571-272-5627. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Cottingham can be reached on 571-272-7079. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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